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Executive Summary

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Projections of Natural Gas and Electricity Prices in Western Montana

Executive Summary

by

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Introduction

This report presents a brief summary of two papers prepared for the Montana Department of Administration and the Montana Energy Advisory Council: The Future Prices of Electricity in Montana by John W. Duffield, and Projecting Natural Gas Prices in Western Montana by Richard Stroup. These studies were funded by the Montana Department of Administration, with staff assistance from the Governor's Office of Budget and Program Planning and the Montana Energy Advisory Council.

The purpose of the project was to provide assistance in life-cycle cost analysis for state buildings, and to provide background information for further energy-related research. Prices for electricity and natural gas were estimated for 1980, 1985 and 1990 for Western Montana (primarily the Montana Power Company service area). The most probable estimates of average future prices are presented in Figures 1 and 2. (See also Tables 1 and 2.) The project was of short duration, (approximately one month), and otherwise limited, so that a sophisticated engineering or econometric effort was not possible.

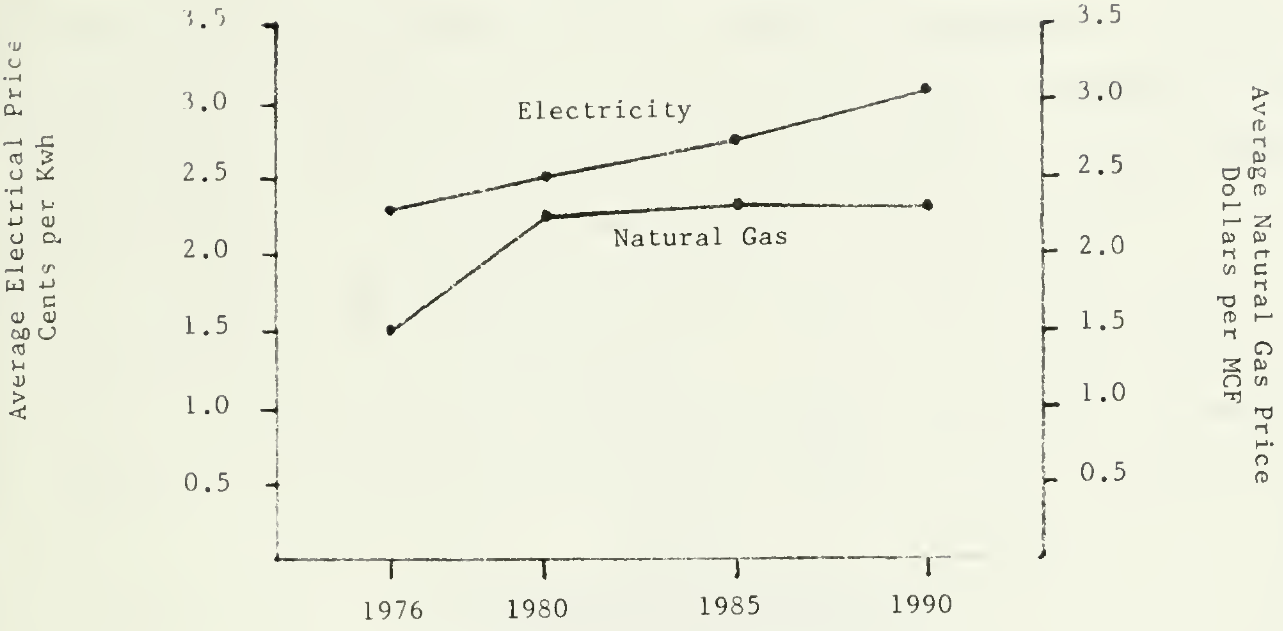
An informal steering committee, composed of energy experts from state government and the private sector,[1/] was assembled to develop the "most reasonable" assumptions upon which to base the authors' research. Their assistance in supplying information and insight was sincerely appreciated.

Copies of the full reports are available from the Energy and Resource Policy Office (formerly the Montana Energy Advisory Council), c/o State Capitol, Helena, Montana.

[1/] The persons involved in this steering committee are listed in the Appendices of the full reports.

Figure 1

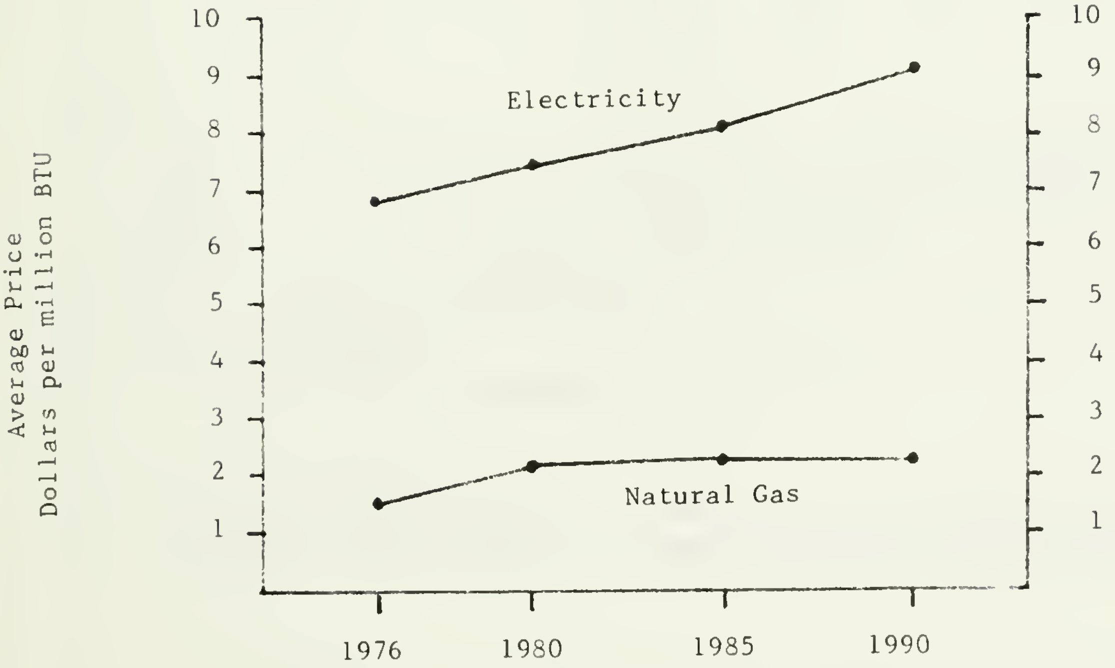
Projected Average Price of Electricity and Natural Gas in Western Montana (Constant 1976 Dollars)



See Notes to Tables 1 and 2.

Figure 2

Projected Average Price of Electricity and Natural Gas in Western Montana (Constant 1976 Dollars per Million BTU's)



See Notes to Tables 1 and 2.

Electric Prices

The major cause of rising future real rates are twofold: First, the rising costs of the factors of production; and secondly, a transition from a system dominated by cheap hydro-power to one increasingly reliant on thermal generation. The findings of this study are that real increases in electric rates in Western Montana will be on the order of two percent per year through 1990.[2]

The specific projection for the Montana Power Company (MPC) system is summarized in Table 1. The base case is the "most probable" projection. The high and low ranges are based on sensitivity analysis performed on alternate assumptions for several major determinants of electrical costs (see below).

Table 1
Projection of Future Average Electrical Rates for the Montana Power Company System
(Constant 1976 Dollars) [a]

	1973[b]	1976[c]	1980	1985	1990
(1) Mills per kilowatt-hour					
High	21.43	23.90	27.62	30.64	35.36
Base	21.43	23.01	25.28	27.46	30.88
Low	21.43	22.79	23.99	25.78	28.38
(2) Dollars per million BTU s[d]					
High	6.28	7.00	8.09	8.98	10.36
Base	6.28	6.74	7.41	8.05	9.05
Low	6.28	6.68	7.03	7.56	8.32

[a] The full report uses constant 1975 dollars which have been converted here using a ratio of 1976 dollars to 1975 dollars of 169.5/164.5 from the Consumer Price Index for all goods for the northcentral region for November to November as reported by the U.S. Bureau of Labor Statistics.

[b] 1973 has been used as the base year since the last full rate adjustment for the Montana Power Company was in 1972.

[c] The 1976 figures do not represent actual rates, but rather are projected from the 1973 base year.

[d] One kilowatt hour is equivalent to 3,412 BTU s.

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[2] The entire analysis is cast in constant dollars so that the expected rate of inflation must be added to estimate the future rates consumers will face.

Forecasts of electrical rates for the Bonneville Power Administration (BPA) system were also made. The specific projection for BPA rates is an average annual increase of 3.65 percent. This is based on the announced intention of the BPA to increase rates by 60 percent in 1979 and 20 percent in 1981. Both of these increases are deflated by the 5 percent inflation rate BPA assumes. Beyond 1981, a 2 percent annual increase is assumed, based on the results for the MPC system and other studies.

The electrical prices forecast in this study are based on current plans of both public and private utilities with regard to growth of consumption and the addition of generating capacity. In fact, higher energy prices will probably lead to somewhat lower levels of consumption. While the sensitivity of rates to a decrease from projected consumption is investigated, it was beyond the resources of this study to provide a fuller simulation of the supply-demand system. However, an appropriate methodology for such price sensitive simulation is outlined.

The results may be interpreted as a supply forecast; that is, the costs of supplying a given quantity of electricity in 1980, 1985 and 1990 are projected. Since electric utilities are publicly regulated, on-average rates will be set at levels that just cover costs. In this study, costs are examined in two major components -- fixed costs associated with investment in plant and equipment and variable costs associated with variable inputs such as fuel. Fixed costs are estimated separately for generation, transmission, distribution and general plant. Variable costs are primarily operation and maintenance expenses for each of the fixed cost categories plus fuel expenses.

In addition to a basic projection of rates, this study identifies the effect of changes in certain parameters on electrical prices. The parameters

examined include the capacity factor for steam generating plants, hydro conditions, future coal costs, future operation and maintenance costs, the allowed rate of return to common equity, the depreciation rate, costs of purchased wholesale power, tax rates, and decreases in the projected consumption of electricity. The rate of return allowed to common equity and increases in future coal costs were found to be particularly sensitive parameters. Further, the major critical parameter was found to be the sensitivity of projected consumption to future price increases. However, additional research is necessary to accurately quantify the effects on demand of higher prices.

Natural Gas Prices

This study forecasts substantial increases in the price of natural gas used in Western Montana. Two components of natural gas demand were considered; industrial and all other, henceforth considered as "residential and commercial".[3] The projected real price increases amount to about 40 percent by 1980 over 1976 costs for residential and commercial users, and about 55 percent for industrial users.[4] Little increase is expected through the 1980's. The specific projection for the Montana Power Company system is summarized in Table 2.

Table 2
Projection of Future Natural Gas Rates
for the Montana Power Company System
(Constant 1976 Dollars)

	1976 [a]	1980	1985	1990
(1) Dollars per MCF				
Residential and Commercial (12.94 psi.)	1.66	2.34	2.44	2.40
Average (14.9 psi.) [b]	1.55	2.27	2.35	2.33
Industrial (14.9 psi.)	1.41	2.20	2.31	2.27
(2) Dollars per million BTUs [c]				
Residential and Commercial (12.94 psi.)	1.82	2.57	2.68	2.64
Average (14.9 psi.) [b]	1.48	2.17	2.25	2.23
Industrial (14.9 psi.)	1.35	2.10	2.20	2.17

[a] The 1976 figures reflect estimated cost of service, which may not be fully reflected in user prices due to rapidly rising gas prices and regulatory lag.
[b] Weighted average of residential/commercial and industrial.
[c] Assumes 1,048 BTU per cubic foot at 14.9 psi. Note that this does not take into account the efficiency of use for natural gas.

The major determinant of gas prices will be the cost of gas available to the utilities. Costs of gas from three sources were estimated for this study: Montana production, Canadian imports, and synthetic natural gas (produced from coal). A key factor in this report's estimates is the availability through 1990 of substantially increased quantities of gas produced in Montana. Supply estimates are based

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[3] The residential and commercial category includes all sales of the Great Falls Gas Company, although about seven percent of this firm's sales are industrial.

[4] The entire analysis is cast in constant dollars, so that the expected role of inflation must be added to estimate the future rates consumers will face.

largely on results of a recent survey of Montana gas producers.[5/] Those supply results are consistent with national estimates of supply elasticity, which imply that a given percentage increase in wellhead price leads to about half that percentage increase in quantity available to pipelines. However, even if the estimates used herein are reduced 20 percent, there is very little impact on price, and no need during the 1980's for gas from Canada. The Montana gas estimate could be cut in half, and all Canadian gas eliminated, and it appears that synthetic natural gas would not be demanded.

Prices were calculated to meet two conditions: (a) quantities demanded are equal to quantities supplied; and (b) the utility revenues are sufficient to cover cost, including return to equity capital. The projections presented in Table 2 were made under the primary -- most likely -- set of assumptions. In addition, this study presents price projections under three alternate assumptions: (a) reduced industrial use of gas due to increased conservation and conversion to other fuels; (b) marginal cost pricing for natural gas; and (c) higher prices for gas purchased by utilities.

This study concludes that the price of gas will undoubtedly continue to rise rapidly in the near future. Little increase beyond 1980 is expected, however, and gas should remain a comparative bargain over propane, fuel oil, and electricity for space heating use wherever coal is inappropriate. There should be no crisis of supply in the next few decades at the new higher prices.

[5/] Frizzell, Thomas, Montana's Natural Gas Supply Crisis, Montana Environmental Quality Council, Helena, Montana, November 1976.